

scale portion **2922** may slide into the charger portion **2924**, protecting the integrity of the scale as well as providing convenient portability.

[0973] Thus, this system has many benefits, including, but not limited to, off-board integrity verification of volume sensing at each disposable change; accurate determination of volume at fill to both accurately track current reservoir volume and thus alarm user when volume is low; method for avoiding under-desired-volume filling or over-desired-volume filling; method of filling a disposable with fluid while also pre-priming (or purging the air) the disposable fluid line; and verification of volume regardless of disposable manufacture variability.

[0974] While the principles of the invention have been described herein, it is to be understood by those skilled in the art that this description is made only by way of example and not as a limitation as to the scope of the invention. Other embodiments are contemplated within the scope of the present invention in addition to the exemplary embodiments shown and described herein. Modifications and substitutions by one of ordinary skill in the art are considered to be within the scope of the present invention.

What is claimed is:

1. A fill adapter system for an infusion pump assembly comprising:

- a reusable fill adapter base configured to releasably engage a reservoir assembly of the infusion pump assembly; and
- a vial adapter assembly comprising:

- at least two vial fingers having a spring force attached to the interior of the housing and a bent portion and configured to maintain the position of the fluid vial wherein the fluid vial overcomes the spring force, wherein when the vial adapter is attached to the fluid vial, the bent portion and the top portion of the fluid vial are not in contact and a predetermined length of separation distance is maintained between the bent portion and a top portion of the fluid vial comprising a fluid vial septum;

wherein when the fluid vial is removed from the vial adapter, the fluid vial first moves the predetermined length of separation distance and the bent portion catches the top portion of the fluid vial, and wherein a tip of a needle is removed from the fluid in the fluid vial and is located inside the fluid vial septum, whereby the fluid in the fluid vial will not continue to flow when the vial adapter is being removed from the fluid vial.

2. The fill adapter of claim **1**, wherein the base comprising a volume control mechanism comprising a turn dial to adjust an available fill volume of a reservoir of the infusion pump assembly.

3. The fill adapter of claim **1**, wherein the base further comprising a pump mechanism configured to pump air into a fluid vial.

4. The fill adapter of claim **1**, further comprising a first needle configured to penetrate the fluid vial septum for fluidly coupling the pump mechanism to the fluid vial.

5. The fill adapter of claim **4**, wherein the vial adapter assembly further comprising a hydrophobic filter within a fluid path of the first needle.

6. The fill adapter of claim **1** wherein the volume control mechanism further comprising a push plate, wherein the turn

dial actuates the push plate and wherein the push plate adjusts the available fill volume of a reservoir of the infusion pump assembly.

7. The fill adapter of claim **1** further comprising a weight scale, the weight scale determining the weight of the infusion pump assembly before filling a volume of fluid and the weight scale determining the weight of the infusion pump assembly after the reservoir is filled to a volume.

8. The fill adapter of claim **4**, further comprising a second needle having a first end configured to penetrate the fluid vial septum and a second end configured to penetrate a reservoir septum of the infusion pump assembly to allow transfer of fluid from the fluid vial to the reservoir of the infusion pump assembly in response to air being pumped into the fluid vial; and

9. The fill adapter of claim **8**, further comprising a needle carriage adapted to carry the first needle and the second needle, wherein the needle carriage slidably attached to the interior of the vial adapter assembly, wherein the needle carriage adapted to slide from a vial end of the vial adapter to a receptacle end of the vial adapter.

10. A filling system for an infusion pump assembly comprising:

- a reusable fill adapter base configured to releasably engage a reservoir assembly of the infusion pump assembly, the base comprising:

- a first needle, the first needle configured to penetrate a fluid vial septum for fluidly coupling the pump mechanism to the fluid vial;

- at least two vial fingers having a spring force attached to the interior of the housing and a bent portion and configured to maintain the position of the fluid vial wherein the fluid vial overcomes the spring force, wherein when the vial adapter is attached to the fluid vial, the bent portion and the top portion of the fluid vial are not in contact and a predetermined length of separation distance is maintained between the bent portion and the fluid vial septum; and

- a second needle having a first end configured to penetrate the fluid vial septum and a second end configured to penetrate a reservoir septum of the infusion pump assembly to allow transfer of fluid from the fluid vial to the reservoir of the infusion pump assembly in response to air being pumped into the fluid vial,

wherein when the fluid vial is removed from the vial adapter, the fluid vial first moves the predetermined length of separation distance and the bent portion catches the top portion of the fluid vial, and wherein a tip of a needle is removed from the fluid in the fluid vial and is located inside the fluid vial septum, whereby the fluid in the fluid vial will not continue to flow when the vial adapter is being removed from the fluid vial.

11. The filling system of claim **10**, wherein the reusable fill adapter base comprising a volume control mechanism comprising a turn dial configured to adjust an available fill volume of a reservoir of the infusion pump assembly.

12. The filling system of claim **10**, wherein the reusable fill adapter base comprising a pump mechanism configured to pump air into a fluid vial.

13. The filling system of claim **11**, wherein the volume control mechanism further comprising a push plate, wherein the turn dial actuates the push plate and wherein the push plate adjusts the available fill volume of a reservoir of the infusion pump assembly